

REAL PARTY IN INTEREST

The real party in interest is MTU Aero Engines GmbH, a corporation having a place of business in Muenchen, Germany and the assignee of the entire right, title and interest in the above-identified patent application. The invention was assigned to MTU Aero Engines GmbH by an assignment from inventor Stefan BEICHL. The assignment was recorded on August 17, 2005 at reel 016894 frame 0136.

I. RELATED APPEALS AND INTERFERENCES

Appellant, his legal representatives, and assignee are not aware of any appeal, interference or judicial proceeding that directly affects, will be directly affected by, or will have a bearing on the Board's decision in this appeal.

II. STATUS OF CLAIMS

Claims 20 to 40 are pending. Claim 24 has been withdrawn from consideration. Claims 20 to 23 and 25 to 40 have been finally rejected as per the Final Office Action dated March 13, 2009.

The rejections to claims 20 to 23 and 25 to 40 thus are appealed. A copy of pending claims 20 to 23 and 25 to 40 is attached hereto as Appendix A.

III. STATUS OF AMENDMENTS AFTER FINAL

No amendments to the claims were filed after the final rejection. A Notice of Appeal was filed on August 25, 2009 and received by the U.S.P.T.O. on August 27, 2009.

IV. SUMMARY OF THE CLAIMED SUBJECT MATTER

Independent claim 20 recites a sealing arrangement (see, e.g., Figure 1, specification at page 3, line 30 to page 4 line 2, paragraph [0019]), comprising at least one first sealing device

including an annular seal (see, e.g., 20 in Fig. 1, specification at page 4, lines 24 and 25, paragraph [0023]); a second sealing device including a brush seal (see, e.g., 21 in Figure 1, specification at page 4, lines 29 to 30, paragraph [0024]); wherein the first and second sealing devices are placed between axially symmetrical components symmetrical about an axis (see, e.g., Figures 1 and 2, specification at page 1, lines 23 to 25, paragraph [0004], specification at page 3 line 32 to page 4, line 2, paragraph [0019], specification at page 6, lines 13 and 14, paragraph [0030]), and the second sealing device is positioned so as to be axially offset from the first sealing device (see, e.g., Figure 2, specification at page 4, line 29, paragraph [0024]); and wherein the annular seal is a metallic piston-ring seal (see, e.g., Figure 1, specification at page 4, line 25 to 26, paragraph [0023]) having a separation site (see, e.g., 40 in Figure 1, specification at page 7, lines 14 and 15, paragraph [0035]).

Independent claim 37 recites a sealing arrangement for fixed components (see, e.g., specification, page 2, line 10, page 7, lines 21 to 22) placed about an axis, comprising at least one first sealing device including an annular seal (see, e.g., 20 in Fig. 1, specification at page 4, lines 24 and 25, paragraph [0023]); a second sealing device including a brush seal (see, e.g., 21 in Figure 1, specification at page 4, lines 29 to 30, paragraph [0024]); wherein the first sealing device and the second sealing device is placed between axially symmetrical components symmetrical about an axis (see, e.g., Figures 1 and 2, specification at page 1, lines 23 to 25, paragraph [0004], specification at page 3 line 32 to page 4, line 2, paragraph [0019], specification at page 6, lines 13 and 14, paragraph [0030]), and the second sealing device is positioned so as to be axially offset from the first sealing device (see, e.g., Figure 2, specification at page 4, line 29, paragraph [0024]); and wherein the annular seal is a metallic piston-ring seal (see, e.g., Figure 1, specification at page 4, line 25 to 26, paragraph [0023]) having a separation site (see, e.g., 40 in Figure 1, specification at page 7, lines 14 and 15, paragraph [0035]).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Whether claims 21 to 23, 38 and 39 should be rejected under 35 U.S.C. § 112, first paragraph as failing to comply with the enablement requirement.

Whether claims 20 to 23 and 25 to 35 should be rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Whether claims 20 to 23, 25, 27 and 30 to 36 should be rejected under 35 U.S.C. § 103(a) as being obvious Turnquist et al. (U.S. Patent No. 6,105,967) in view of Kono (U.S. Publication No. 2002/0140174).

Whether claims 26, 28 and 29 should be rejected under 35 U.S.C. § 103(a) as being obvious over Turnquist et al. in view of Kono and further in view of Beichl et al. (U.S. Publication No. 2004/0188943).

Whether claims 37 to 40 should be rejected under 35 U.S.C. § 103(a) as being obvious over Turnquist et al. in view of Kono and further in view of Hagle (U.S. Patent No. 5,074,748).

VII. ARGUMENTS

A. Rejections under 35 U.S.C. § 112, second paragraph

Claims 20 to 23 and 25 to stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Applicant respectfully submits the term “axially symmetrical” has been selected by Applicants to adequately describes the orientation of the housing and guide vane as described in the present invention and is fully congruent with the drawings, e.g. Figure 1. Applicant further submits that an alteration of the term “axially symmetrical” may mischaracterize the nature of Applicant’s invention. Therefore, Applicant respectfully re-directs the Examiner’s attention to paragraph [0004] of the specification as filed wherein the axially symmetrical components are described as being “disposed concentrically about one another” and paragraph [0019] which

states that “[t]he axially symmetrical guide vane is disposed concentrically about axially symmetrical housing 10” as depicted in Figure 1. Similarly, paragraph [0030] states: “First sealing device 20 having an annular seal design and second sealing device 21 having a brush seal design are axially symmetrical, as are housing 10 and the guide vanes, and are positioned between these two concentrically disposed, axially symmetrical components.” Applicant respectfully submits that in view of paragraphs [0004], [00019], and [0030] in conjunction with Figure 1, the term “axially symmetrical components” would be clear to one of skill in the art. Applicant reasserts that the term “axially symmetrical” means that in the axial direction the components are symmetrical about an axis.

Furthermore, Applicant also notes that the term “axially symmetric” is found in granted U.S. Patent No. 4,563,128 to Rossmann, et al. wherein it states that the term axially symmetrical is “symmetric relative to the longitudinal , radial axis” of the blade. See Rossmann, col. 2, lines 25 to 28. Applicant submits that the Rossmann definition of “axially symmetric” is congruent with the use of the term in the present specification.

Moreover, the term “components” is also a well-understood and definite term.

Based on the foregoing, withdrawal of the rejections under 35 U.S.C. §112, second paragraph to claims 20 to 23 and 25 is respectfully requested.

C. Rejections under 35 U.S.C. §103(a)

Claims 20 to 23, 25, 27 and 30 to 36 stand rejected under 35 U.S.C. § 103(a) as being obvious Turnquist et al. (U.S. Patent No. 6,105,967) in view of Kono (U.S. Publication No. 2002/0140174).

Claim 20 of the present invention recites: “A sealing arrangement, comprising: at least one first sealing device including an annular seal; a second sealing device including a brush seal; wherein the first and second sealing devices are placed between axially symmetrical components symmetrical about an axis, and the second sealing device is positioned so as to be axially offset from the first sealing device; and wherein the annular seal is a metallic piston-ring seal having a separation site”.

The Office Action admits that the Turnquist et al. reference fails to explicitly disclose the

annular seal being a piston-ring seal.

The Kono patent does not cure the deficiency of the Turnquist patent because Kono also does not teach or suggest an “annular seal is a metallic piston-ring seal having a separation site.” The Kono patent at col. 1, lines 9 to 13 as cited by the Examiner, describes “an assembly-type brush seal device that allows enlargement through combination of split-body parts and that can be assembled with or removed from a shaft easily.” As such Kono describes a brush seal device comprising a brush seal and split body parts, but not that an “annular seal is a metallic piston-ring seal having a separation site” as recited in claim 20 of the present invention. Therefore, Kono does not teach or suggest the combination of “at least one first sealing device including an annular seal; a second sealing device including a brush seal...wherein the annular seal is a metallic piston-ring seal having a separation site” as recited in claim 20 of the present invention. In fact the combination of the Kono patent and the Turnquist patent as suggested by the Examiner would result in a sealing arrangement consisting of two brush seals and not “at least one first sealing device including an annular seal; a second sealing device including a brush seal...wherein the annular seal is a metallic piston-ring seal having a separation site” as recited in claim 20 of the present invention.

The Office Action also states that “it would be obvious to one of ordinary skill in the art at the time of the invention to make the annular seal of the Turnquist et al. reference a split ring in view of the teachings of the Kono reference in order to allow enlargement through combination of split-body parts.” See Office Action, page 5, third full paragraph. However, the Turnquist patent shows “combination brush and labyrinth seals.” See Turnquist, col. 1, lines 10 to 11. As admitted by the Office Action, Turnquist et al. reference fails to explicitly disclose the annular seal being a piston-ring seal. As discussed above, Kono fails to cure this deficiency of Turnquist. Moreover, Turnquist describes that “to prevent relative circumferential movement of the brush segment and seal ring segment, the brush segment and seal ring segments are welded to one another adjacent one or both opposite end faces”. See Turnquist, col. 5, lines 45-48. (Emphasis added). Moreover, Turnquist would not want a piston-ring seal as it segments its backing plate 38, as well as its seal ring 14 (See Col. 1, lines 65 et seq.).

Based on the foregoing, reversal of the rejections under 35 U.S.C. § 103(a) to claims 20

to 23, 25, 27 and 30 to 36 is respectfully requested.

Claims 26, 28 and 29: Argued Separately

Claims 26, 28 and 29 stand rejected under 35 U.S.C. § 103(a) as being obvious over Turnquist et al. in view of Kono and further in view of Beichl et al. (U.S. Publication No. 2004/0188943).

Claims 26, 28 and 29 all indirectly depend from independent claim 20. The rejection to claim 20 under 35 U.S.C. § 103(a) as being obvious to the Turnquist et al. patent and the Kono patent is discussed above.

Beichl et al. describes a device for a non-hermetic seal. In addition to the arguments above, Beichl fails to cure the deficiencies of the Turnquist and Kono patents because Beichl fails to teach or suggest “at least one first sealing device including an annular seal; a second sealing device including a brush seal...wherein the annular seal is a metallic piston-ring seal having a separation site” as recited in claim 20 of the present invention.

Based on the foregoing, reversal of the rejections under 35 U.S.C. § 103(a) to claims 26, 28 and 29 is respectfully requested.

Claims 37 to 40: Argued Separately:

Claims 37 to 40 stand rejected under 35 U.S.C. § 103(a) as being obvious over Turnquist et al. in view of Kono and further in view of Hagle (U.S. Patent No. 5,074,748).

Claim 37 of the present invention recites: “A sealing arrangement for fixed components placed about an axis, comprising: at least one first sealing device including an annular seal; a second sealing device including a brush seal; wherein the first sealing device and the second sealing device is placed between axially symmetrical components symmetrical about an axis, and the second sealing device is positioned so as to be axially offset from the first sealing device; and wherein the annular seal is a metallic piston-ring seal having a separation site.

The Office Action admits that the Turnquist et al. reference fails to explicitly disclose the annular seal being a piston-ring seal. As discussed above, the Kono patent does not cure the deficiency of the Turnquist patent because Kono also does not teach or suggest an “annular seal

is a metallic piston-ring seal having a separation site.”

Hagle describes a seal assembly for segmented turbine engine structures. Hagle also fails to cure the deficiencies of the Turnquist and Kono patents because Hagle fails to teach or suggest “at least one first sealing device including an annular seal; a second sealing device including a brush seal...wherein the annular seal is a metallic piston-ring seal having a separation site” as recited in claim 37 of the present invention.

Claims 38 to 40 all depend from independent claim 37.

Based on the foregoing, reversal of the rejections under 35 U.S.C. § 103(a) to claims 37 to 40 is respectfully requested.

CONCLUSION

It is respectfully submitted that the application is in condition for allowance. Favorable consideration of this appeal brief is respectfully requested.

Respectfully submitted,
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APPENDIX A:

PENDING CLAIMS 20 to 40
U.S. APPLICATION SERIAL NO. 10/540,203

Listing of Claims:

- Claim 20 (previously presented): A sealing arrangement, comprising:
at least one first sealing device including an annular seal;
a second sealing device including a brush seal;
wherein the first and second sealing devices are placed between axially symmetrical components symmetrical about an axis, and the second sealing device is positioned so as to be axially offset from the first sealing device; and
wherein the annular seal is a metallic piston-ring seal having a separation site.
- Claim 21 (previously presented): The sealing arrangement as recited in claim 20,
wherein the brush seal is inserted into a recess of a housing in an axial direction and is secured into position by a fastening ring.
- Claim 22 (previously presented): The sealing arrangement as recited in claim 20,
wherein the brush seal is inserted or snapped in over a fastening ring into a recess of a housing.
- Claim 23 (previously presented): The sealing arrangement as recited in claim 22,
wherein the brush seal is in the form of a split ring.
- Claim 24 (withdrawn): The sealing arrangement as recited claim 20,
wherein the brush seal is a hook-type brush seal.
- Claim 25 (previously presented): The sealing arrangement as recited in claim 20,
wherein the brush seal includes a plurality of bristle elements.

Claim 26 (previously presented): The sealing arrangement as recited in claim 25, wherein the bristle elements are wound around a guide element, forming a fixing point, and are secured by a clamping element to the guide element.

Claim 27 (previously presented): The sealing arrangement as recited claim 20, wherein one end of the second sealing device is positioned in a recess of a first one of the axially symmetrical components.

Claim 28 (previously presented): The sealing arrangement as recited in claim 27, wherein the bristle elements are wound around a guide element, forming a fixing point, and wherein the brush seal is situated in the recess in such a way that the fixing point is positioned in the recess of the first one of the axially symmetrical components, and the unattached ends of the bristle elements extend toward a second one of the axially symmetrical components.

Claim 29 (previously presented): The sealing arrangement as recited in claim 28, wherein the unattached ends of the bristle elements engage the second one of the axially symmetrical components.

Claim 30 (previously presented): The sealing arrangement as recited claim 25, wherein the bristle elements are radially preloaded such that they have a curved shape in the radial direction.

Claim 31 (previously presented): The sealing arrangement as recited in claim 20, wherein, in the axial direction of the axially symmetrical components, the second sealing device is directly contiguous to the first sealing device.

Claim 32 (previously presented): The sealing arrangement as recited in claim 25, wherein the first sealing device forms a supporting plate for the bristle elements of the

second sealing device.

Claim 33 (previously presented): The sealing arrangement as recited in claim 20, wherein a second one of the axially symmetrical components surrounds a first one of the axially symmetrical components.

Claim 34 (previously presented): The sealing arrangement as recited in claim 33, wherein the second one of the axially symmetrical components is made up of a plurality of segments.

Claim 35 (previously presented): The sealing arrangement as recited in claim 20, wherein a first one of the axially symmetrical components comprises a housing of a gas turbine, and the second one of the axially symmetrical components includes a guide vane ring of the gas turbine having a plurality of vane segments, the first sealing device and the second sealing device being positioned between the housing and the vane segments in order to seal a gap.

Claim 36 (previously presented): The sealing arrangement as recited in claim 20 wherein the separation site has an overlapping form.

Claim 37 (previously presented): A sealing arrangement for fixed components placed about an axis, comprising:

at least one first sealing device including an annular seal;

a second sealing device including a brush seal;

wherein the first sealing device and the second sealing device is placed between axially symmetrical components symmetrical about an axis, and the second sealing device is positioned so as to be axially offset from the first sealing device; and

wherein the annular seal is a metallic piston-ring seal having a separation site.

Claim 38 (previously presented): The sealing arrangement as recited in claim 37, wherein the brush seal is inserted into a recess of a housing in an axial direction and is

secured into position by a fastening ring.

Claim 39 (previously presented): The sealing arrangement as recited in claim 37,
wherein the brush seal is inserted or snapped in over a fastening ring into a recess of a
housing.

Claim 40 (previously presented): The sealing arrangement as recited in claim 37,
wherein the brush seal includes a plurality of bristle elements.

APPENDIX B

Evidence Appendix under 37 C.F.R. §41.37 (c) (ix):

No evidence pursuant to 37 C.F.R. §§1.130, 1.131 or 1.132 and relied upon in the appeal has been submitted by appellants or entered by the examiner.

APPENDIX C

Related proceedings appendix under 37 C.F.R. §41.37 (c) (x):

As stated in “2. RELATED APPEALS AND INTERFERENCES” of this appeal brief, appellants, their legal representatives, and assignee are not aware of any appeal or interference that directly affects, will be directly affected by, or will have a bearing on the Board's decision in this appeal.